Freshwater Monitoring in SWAN Parks

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Site Selection

Vital Signs
metrics and goals

Activities for 2005
protocol development

Monitoring Goals

- assess long-term ecological integrity
- document whether a change has occurred
- not necessarily provide the information necessary to determine mechanisms
- identify a need to take action and/or follow-up with more focused research
- Provide value to manager (e.g. individual park units)

Priority

Focus on Large Lake and River Systems

(other systems include wetlands, small ponds and tundra lakes)

Katmai Lakes

Lake Name	Elevation (m)	Surface Area (ha)
Crater Lake	-	529
Jojo Lake	-	673
Iliuk Arm Naknek Lak	10	9295
Naknek Lake	10	58468
North Arm Naknek La	10	18425
Lake Brooks	19	7557
Lake Coville	33	3445
Lake Grosvenor	33	7381
Dakavak Lake	91	408
Nonvianuk Lake	200	6328
Kulik Lake	201	2798
Idavain Lake	223	1074
Battle Lake	254	1300
Kukaklek Lake	274	17372
Spectacle Lake	274	200
Katmai Lakes	335	21
Pirate Lake	350	247
Mirror Lake	381	153
Hammersly Lake	487	879
Murray Lake	503	263

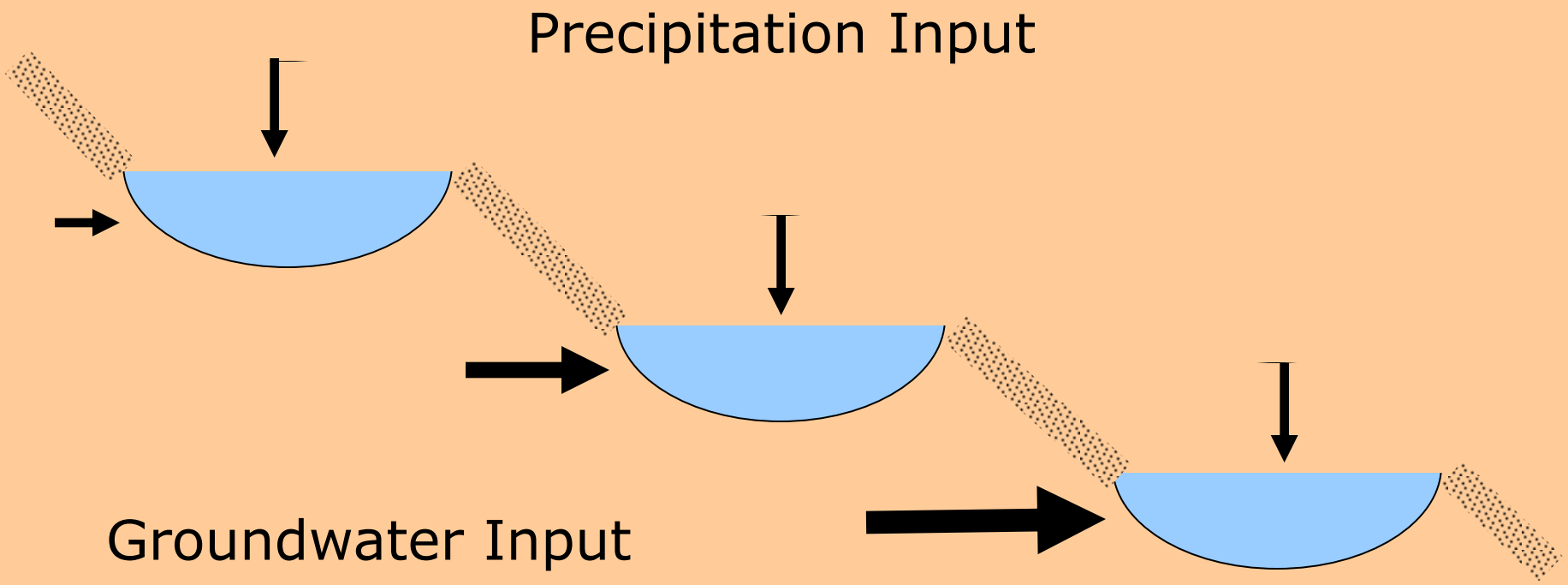
Sentinel Sites

- Some subset of the network must encounter the stressor
- Some sites must have features that cause responsiveness to that stressor
- Background variability at those sites must not disguise the response to the stressor of interest
- Reliable extrapolation from sentinel-site networks to regional trends appears to be challenging

Jassby 1998

Landscape Position

Lake's explicit location relative to the type and strength of its connection to a drainage network.

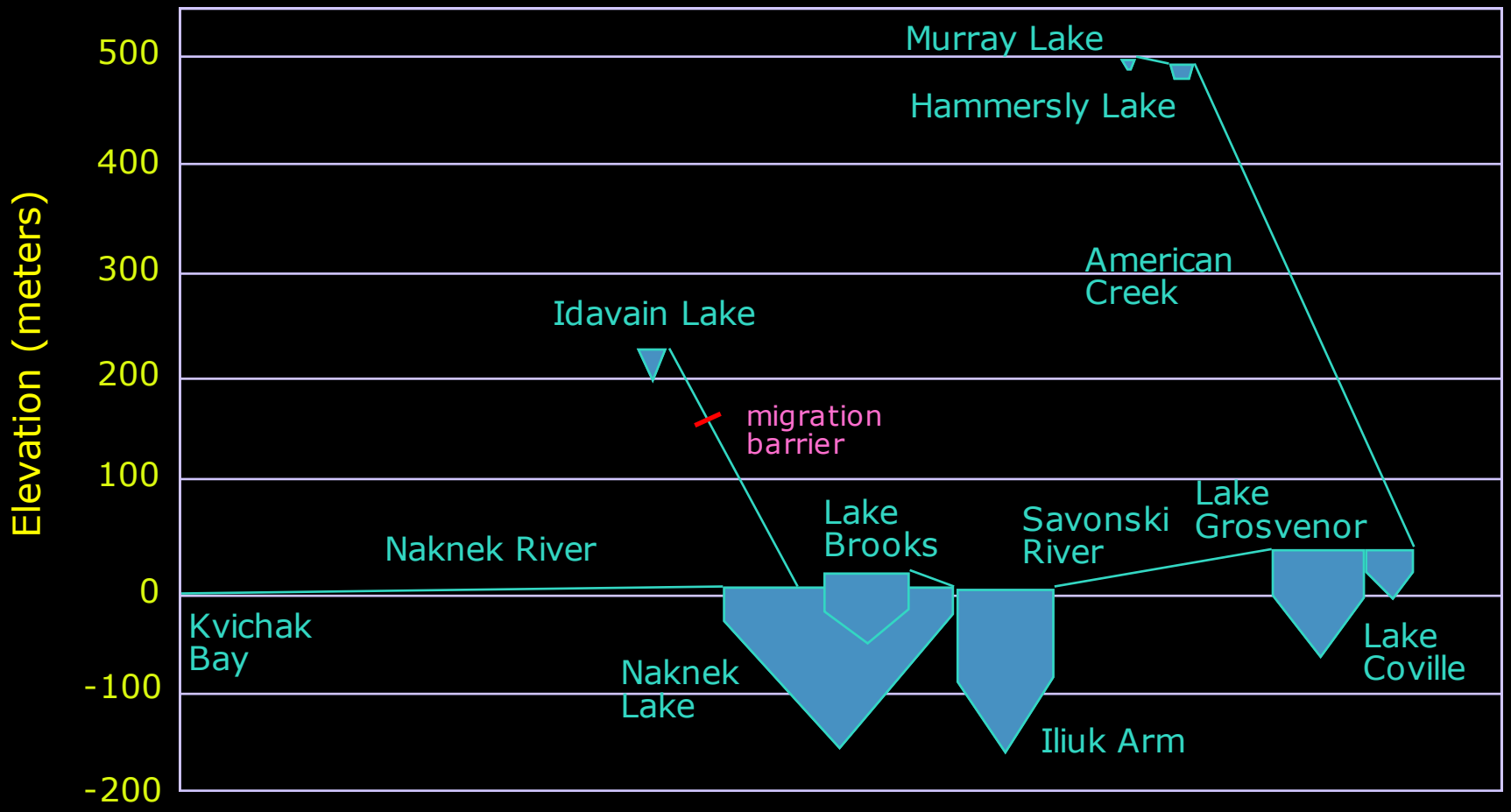


NTL-LTER

Landscape Position

- Lakes connected across the landscape rather than spatially separate entities
- Gradients of geomorphology and hydrology
- Landscape perspective based on lake position is robust
- Discontinuities can “reset” the spatial template

Sorrano



Based on Buck et al. 1978

Challenge

Develop a “Network-wide” understanding of freshwater systems and not just isolated studies on individual lakes or rivers.

Accomplish within resources available

Katmai/Alagnak

Site Coverage: Naknek system and selected coastal system.

- Tier 1: Naknek Lake, and Brooks Lake
- Tier 2: JoJo Lake, Grosvenor Lake, Murray Lake, and Hallo Lake system.
- Tier 3: Kukaklek Lake, Battle Lake, and Dakavak Lake.

Lake Clark

Site Coverage: Lake Clark system and selected coastal system.

- Tier 1: Lake Clark, Kontrashibuna Lake
- Tier 2: Kijik Lake, Lachbuna Lake, and Crescent River system
- Tier 3: Twin Lakes and Telaquana Lake

Kenai Fjords

Site Coverage: Broad north-south distribution, management issues addressed.

- Tier 1: Resurrection River and Exit Creek.
- Tier 2: Delusion Lake (not slated for fertilization), and Nuka River.

Aniakchak

Site Coverage: a primary park drainage.

- Tier 2: Aniakchak River drainage, including Surprise Lake..

Freshwater Systems

- Resident Fish
- Salmon
- Water Quality
- Surface Water Hydrology

Resident Fish
Complete Dec ‘05, Implement ‘07

- Abundance: Inadequate statistical power to quantify all but a major change with CPUE data (for a 50% change, 16 nets)
- Community (Inventory Sampling): Estimating rates of species extinction, colonization, and turnover.

Salmon

Draft ‘06, Implement ‘08

ADF&G data and partnerships

- Distribution: Aerial Surveys
- Abundance: Adult Spawner Return

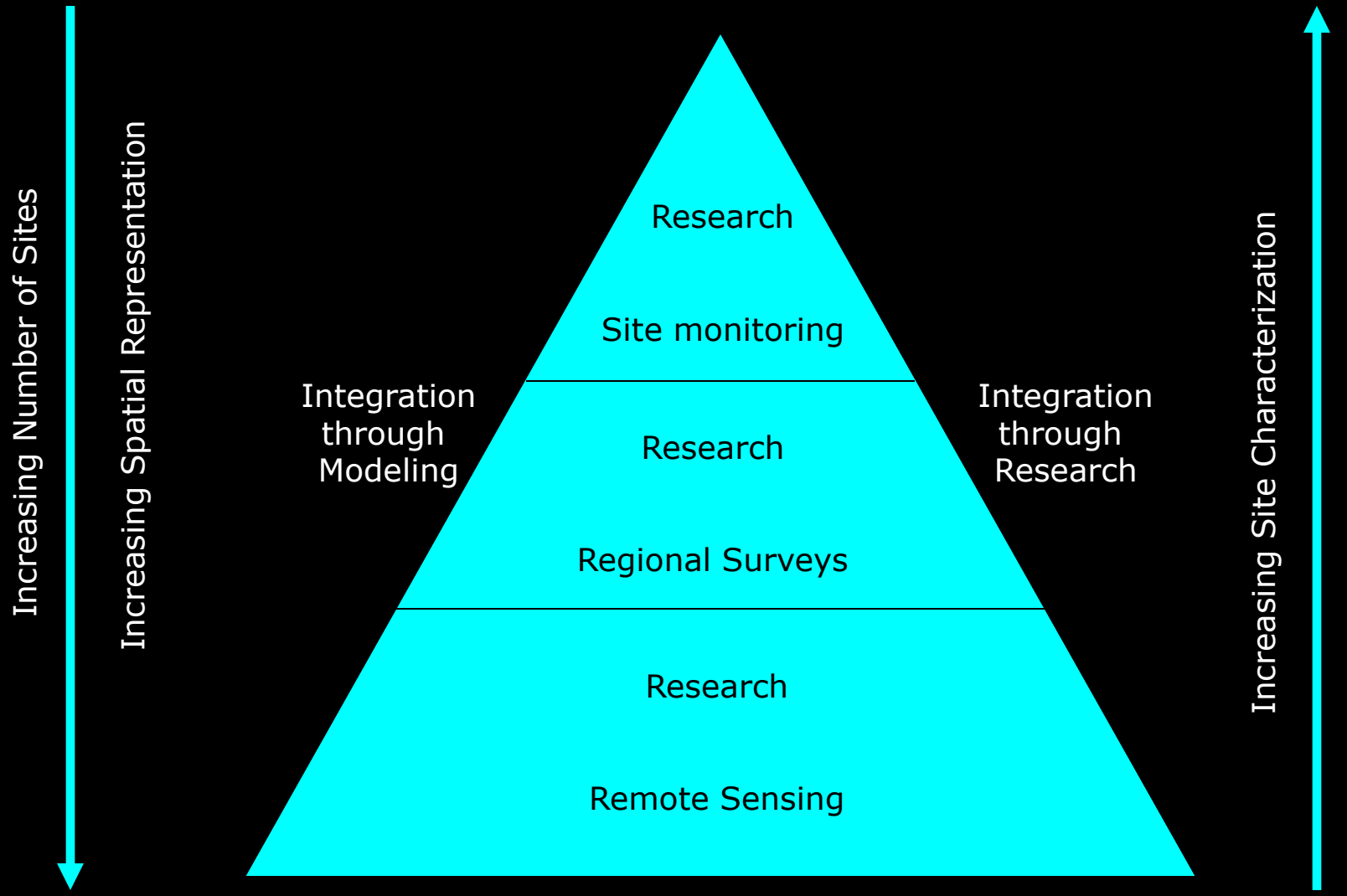
Water Quality

Complete Dec ‘05, Implement ‘07

- Dissolved Oxygen
- pH
- Conductivity
- Temperature
- Discharge
- Nutrients (TN, TP)
- Chlorophyll
- Major Ions
- TSS

Surface Water Hydrology
Draft ‘06, Implement ‘09

- Discharge and Staff Gauge for rivers
- Lake Level



Bricker and Ruggiero, 1998, Ecological Applications

For 2005

- Develop database of major water bodies
- Salmon: develop protocol development summary focused on leveraging partnerships
- Resident Fish: develop protocol focused on community parameters
- Water Quality: develop protocol focused on core suite and other key parameters
- Surface Water Hydrology: develop protocol development summary focused on lake level and discharge for key systems